

B&R Power Supply PS310

1. General Information

Features of the B&R power supply PS310:

- Input: 3 x 400 - 500 VAC
(2 phase and 3 phase operation)
- Output: 24 - 28 VDC / 240 W
- Power boost up to 288 W
- Separate primary fuse not required
- Switchable operating mode (single/parallel)
- Switchable overload behavior options (Fuse Mode / Continuous Mode)
- Robust mechanics and EMC
- DIN rail mounting, unit holds even with vibrations or lateral pressure
- Clearly arranged and user-friendly
- Large, robust screw terminals
- Closed metal housing
- Fine ventilation grid

This compact power supply unit is characterized by the variety of application possibilities and low system costs. The fact that the **external fuses are no longer necessary** is an advantage as it saves cost and space. The switchable **Fuse Mode**, the fully specified **2 phase operation** and the extremely comprehensive **certification package** including EN 60204 make the power supply PS310 the unit of choice.

At a competitive price, it also offers **12 A power boost**, 20 A short-circuit current, **output noise suppression**, optional *single or parallel mode*, small dimensions, more than **500,000 hours MTBF** as well as easy installation. The unit can be connected to European and American power supply networks **without switching**.

2. Order Data

Model Number	Short Description	Image
0PS310.1	24VDC power supply, 3 phases, 10 A, Input 400..500VAC (3 phases), wide range, DIN rail mounting	

Table 1: PS310 - Order data

3. Technical Data

See also data sheet "Technical data", which is delivered with the power supply.

Name	PS310
General Information	
C-UL-US Listed	Yes
Input	
Input Voltage, Nominal	2 x and 3 x 400 - 500 VAC, 47 - 63 Hz, suitable for IT power systems 2-phase operation is specified and permissible. Connection of 3 phases is recommended due to reduced component stress.
Admissible Limits Continuous Operation Short-Term (1 min)	at 24 VDC / 10 A, 2- and 3-phase operation 340 - 576 VAC or 450 - 820 VDC 300 - 620 VAC or 400 - 890 VDC see "DC operation" on Page 7 for operation with DC input voltage
Nominal Input Current (at 24 V / 10 A)	3 x 0.7/0.6 A at 400/500 VAC 2 x 1.25/1 A at 400/500 VAC
Starting Current	See "Starting current" on Page 5
Fuse Protection Internal External	Each phase is internally fused. External fusing is only necessary as required for input line protection.
Harmonic Current Emissions	According to EN 61000-3-3
Transient Immunity	Transient resistance acc. to VDE 0160 / W2 (1300 V / 1.3 ms), over entire load range.
Emissions	2 and 3-phase operation: acc. to EN 61000-6-3 (Class B)
Hold-Up Time	>24 ms (3 phase operation at 400 VAC, 24 VDC / 10 A) >20 ms (2 phase operation at 400 VAC, 24 VDC / 10 A)

Table 2: PS310 - Technical data

PS310	
Output	
Output Voltage	24 - 28 VDC adjustable by (covered) front potentiometer Preset: 24,5 V \pm 0.5% Adjustable range guaranteed
Voltage Regulation	Better than 2% V_{out} overall, jumper in <i>Single Mode</i> position
Residual Ripple	<30 mV _{SS} (20 MHz bandwidth)
Over-Voltage Protection	typ. 36 V, max. 39 V
Output Noise Suppression	Radiated EMI values below EN 61000-6-3 (Class B) even with long, unshielded output cables
Continuous loading $T_{amb}=0^{\circ}\text{C} - 60^{\circ}\text{C}$ $T_{amb}=0^{\circ}\text{C} - 45^{\circ}\text{C}$	With convection cooling 24 V / 10 A (240 W) respectively 28 V / 8.6 A (240 W) 24 V / 12 A (288 W) respectively 28 V / 10.3 A (288 W)
Protection Functions	Output is protected against short-circuit, open circuit and overload
Derating	Typ. 6 W/K (at $T_{amb}=+60^{\circ}\text{C}$ to $+70^{\circ}\text{C}$)
Parallel Operation	Yes, up to five PS310 For uniform current distribution: <ul style="list-style-type: none"> • Plug jumper into position "Output parallel use". This alters the output V/I characteristics to be "softer" (25 V at 1 A, 24 V at 10 A). The output voltage can still be adjusted. • Missing jumper = "Single Use", i.e. "hard" characteristics
Power Back Immunity	34 V
Operation Indicator	Green LED on when $V_{out}>18\text{ V}$ Red LED flashes after switch-off in fuse mode
Efficiency, Reliability	
Efficiency / loss	
3-phase operation	Typ. 91.2% / PV = 23.6 W (400 V)
2-phase operation	Typ. 92.0% / PV = 21.4 W (500 V) Typ. 90.9% / PV = 24.5 W (400 V)
MTBF (Reliability)	At 24 V / 10 A, 400 VAC, $T_{U} = +40^{\circ}\text{C}$
3-phase operation	543,000 h
2-phase operation	525,000 h
Life Cycle (Electrolytic Capacitors)	The unit exclusively uses long-life electrolytic capacitors, specified for $+105^{\circ}\text{C}$
Start / Overload Behavior	
Startup Delay	Typ. 100 ms
Startup Time	Approx. 5 - 20 ms depending on the load
Overload Behavior	See "Overload behavior" on Page 5
Overtemperature Protection	
Continuous Mode	Switch-off and automatic restart after cooling
Fuse Mode	Unit remains switched off after overheating until restart (see "Restart" on Page 5)

Table 2: PS310 - Technical data (cont.)

B&R Power Supply PS310

Name	PS310
Connection	
Terminals	Robust screw terminals
Connection Cross Section Input / Output	Solid: 1.5 - 6 mm ² / flexible: 1.5 - 4 mm ² 2 connectors per output
Load Capacity	30 A per output
Grid Input Output	Distance between adjacent connectors: 9.52 mm 6.35 mm
Operational Conditions	
Environmental Temperature During Operation	0°C to +70°C (starting at 60°C derating)
Relative Humidity During Operation	Max. 95%, non-condensing
Storage and Transport Conditions	
Storage Temperature	-25°C to +85°C
Relative Humidity During Storage	Max. 95%, non-condensing
Transport Temperature	-25°C to +85°C
Relative Humidity During Transport	Max. 95%, non-condensing
Mechanical Characteristics	
Dimensions (W x H x D [mm])	89 x 124 x 117 (+ rail)
Weight	980 g
Housing	Robust sealed metal housing with fine ventilation grid (◇ 3.5 mm, IP20)
Installation	Mounting on DIN rail (TS35/7.5 or TS35/15, 1 to 1.5 mm thick), therefore: <ul style="list-style-type: none"> • Simple snap-on system • Sits safely and firmly on the DIN rail • No tools required for removal
Ventilation / Cooling	Above/below 50 mm recommended Left/right 20 mm recommended
Special Features	<ul style="list-style-type: none"> • All operational elements (incl. terminals) should be clearly labeled and easy to reach on the front pane of the device. • PVC insulated cable can be used for all connections because the connection blocks are mounted on the cooler area on the underside of the unit.

Table 2: PS310 - Technical data (cont.)

Specifications are valid for 3 x 400 VAC input voltage, +25°C ambient temperature, and 5 min run-in time unless otherwise stated. They are subject to change without prior notice.

3.1 Starting current

(supply impedance according to EN 61000-3-3, $T_{amb}=+60^{\circ}\text{C}$, cold start)

	400 VAC	500 VAC	575 VAC
Maximum current	<50 A	<60 A	<70 A
I^2t	<1.5 A ² s	<2.5 A ² s	<3.2 A ² s

Table 3: PS310 - Starting current

3.2 Overload behavior

Two different operating mode options, switchable by moving the front-panel jumper. If the jumper is missing, the unit is in fuse mode. The unit is delivered preset in continuous mode.

3.2.1 Continuous mode (continuous current)

- Jumper is in the "OVL cont. mode" position.
- When overload or short-circuit occurs, the unit continuously supplies current (see "Output characteristics" on Page 10), no hiccup.

Advantage: The unit starts reliably even with heavy, non-linear loads (high capacities, DC-DC converters, motors). The high short-circuit current triggers downstream fuses and allows for selective configuration of electrical installations.

3.2.2 Fuse mode (switch-off after typ. 5 s)

- Jumper is in the "OVL fuse mode" position.
- When overload or short-circuit occurs for more than 5 s, the unit switches off the output.
- Definition of overload or short-circuit: The set output voltage in each case can no longer be maintained.
- The capacity to deliver current (Overload Design) (see "Output characteristics" on Page 10) remains unchanged during the 5 s delay.
- **Red LED flashes** when switched off.

Properties: With some applications, the fuse mode can replace the usual fusing on the secondary side. The fuse mode has closer tolerances than thermal triggers. The release delay time of typ. 5 s ensures that motors can be reliably operated.

3.2.3 Restart

- By pushing the restart button on the unit's front panel.
- By disconnecting from the supply voltage and restarting the unit after >1 min. or as soon as the red LED stops flashing.

4. Dimensions

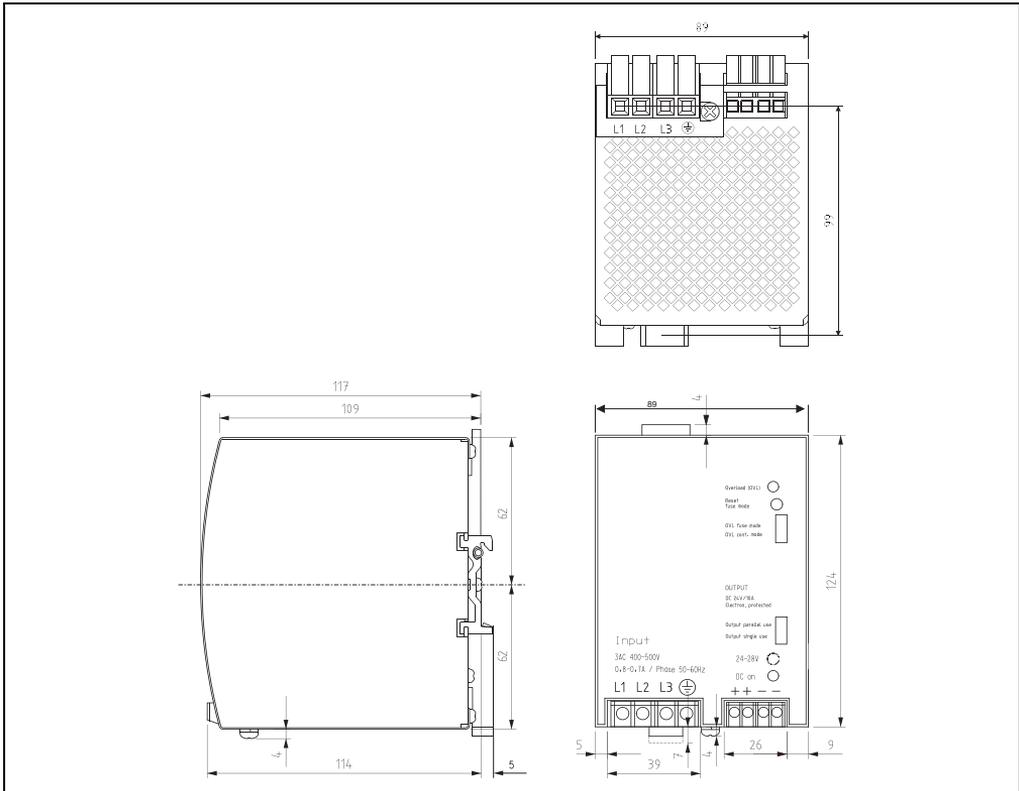


Figure 1: PS310 - Dimensions

5. Installation

See also the basic installation manual "Installation and Operation". The basic installation manual is delivered with each power supply.

6. DC operation

The B&R switching power supplies work internally on the primary side with DC voltage. As a result, the DC voltage is possible as an alternative to AC voltage on the power supply terminals. The amount of DC input voltage for continuous operation and for permissibly higher short-term values is specified in the technical data.

Limitations may occur due to the combination of the electrical design of the power supply (e.g. the converter principle used) and the method of DC voltage supply (e.g. the grounding conditions). The following examples illustrate some conditions under which limitations are produced and in which circumstances the values specified in the technical data apply.

Note:

The pins on L1, L2 and L3 can be assigned any way and do not have to follow a specific pattern.

6.1 DC mains, grounded minus pin

Maximum DC input voltage limited: $V_{\max} = \text{DC } 540 \text{ V}$

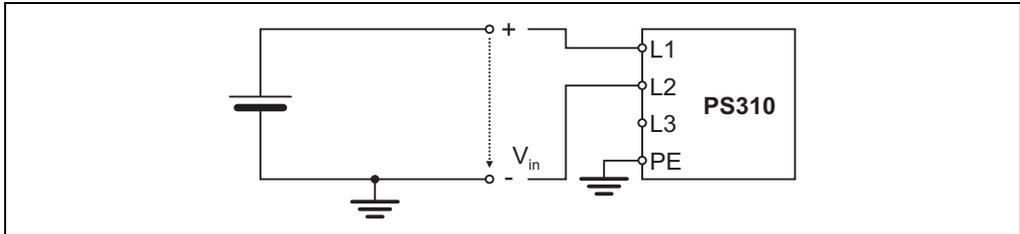


Figure 2: PS310 - DC mains, grounded minus pin

6.2 DC mains, grounded plus pin

Maximum DC input voltage limited: $V_{\max} = \text{DC } 580 \text{ V}$

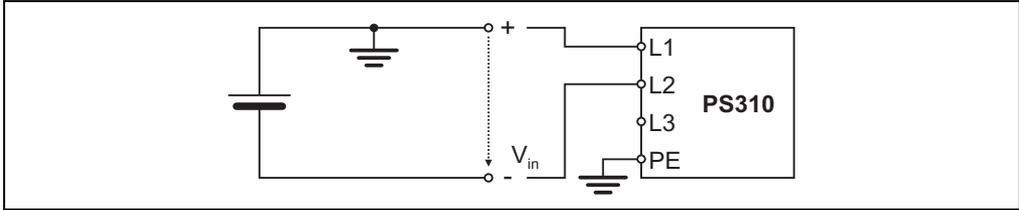


Figure 3: PS310 - DC mains, grounded plus pin

6.3 DC mains, grounded neutral point

No limitation: $V_{\max} = \text{DC } 820 \text{ V}$ (see "Technical Data" on Page 2)

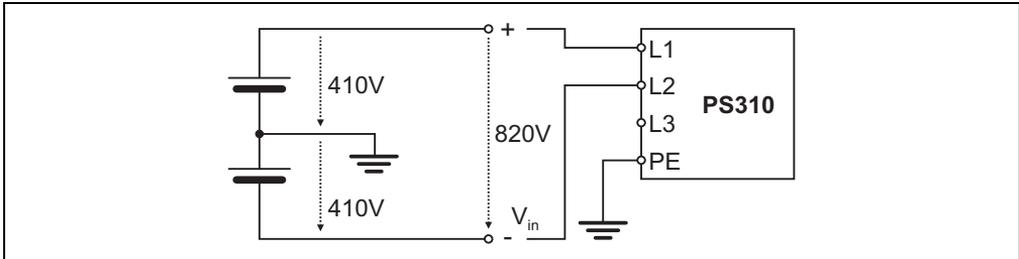


Figure 4: PS310 - DC mains, grounded neutral point

6.4 Rectified 3-phase mains, grounded external conductor

No limitation if the power supply is designed for grounded external conductors (IT power systems).

DC input voltage (see "Technical Data" on Page 2): $V_{max} = DC 820 V$

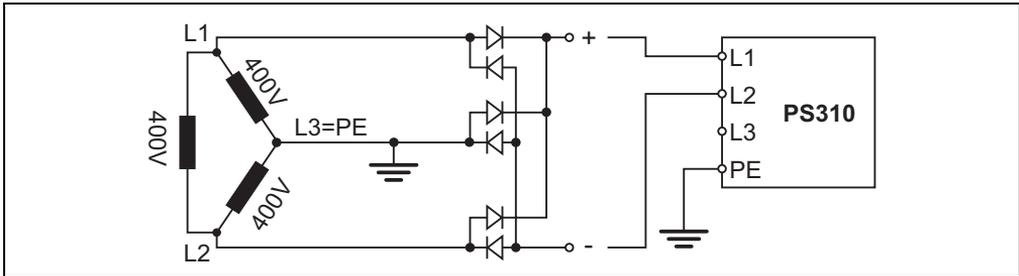


Figure 5: PS310 - Rectified 3-phase mains, grounded external conductor

6.5 Rectified 3-phase neutral mains, grounded neutral

No limitation: $V_{max} = DC 820 V$ (see "Technical Data" on Page 2)

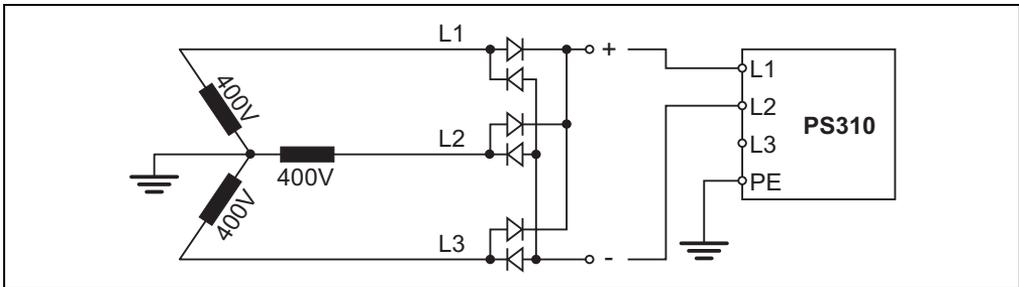


Figure 6: PS310 - Rectified 3-phase neutral mains, grounded neutral

7. Diagrams

7.1 Output characteristics

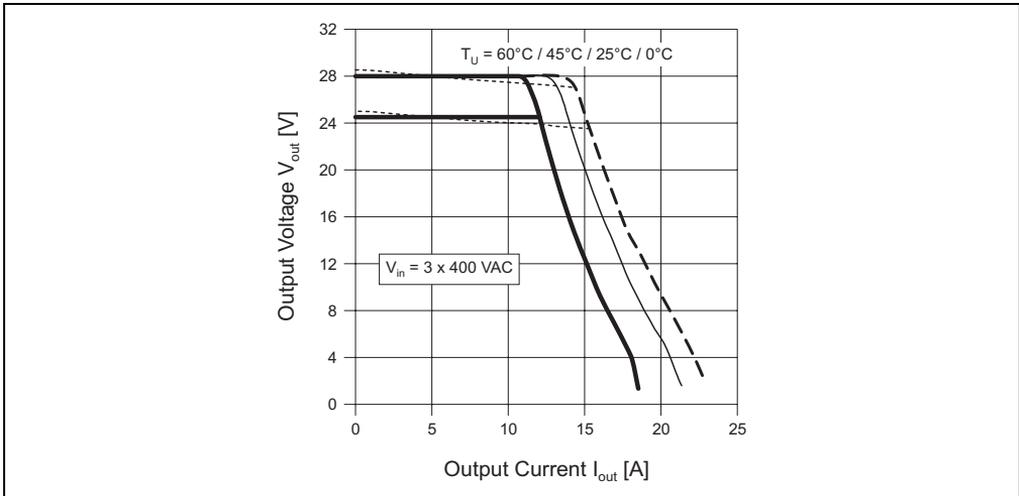


Figure 7: PS310 - Output characteristics (min.)

7.2 Efficiency - 3-phase

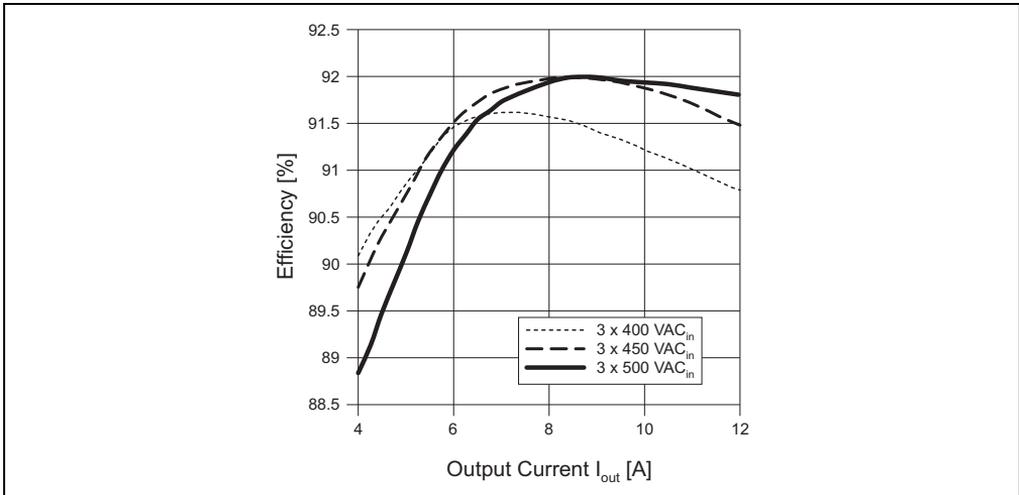


Figure 8: PS310 - Efficiency - 3-phase (min., at $V_{out} = 24.5 \text{ V}$)

7.3 Hold-up time, 3-phase

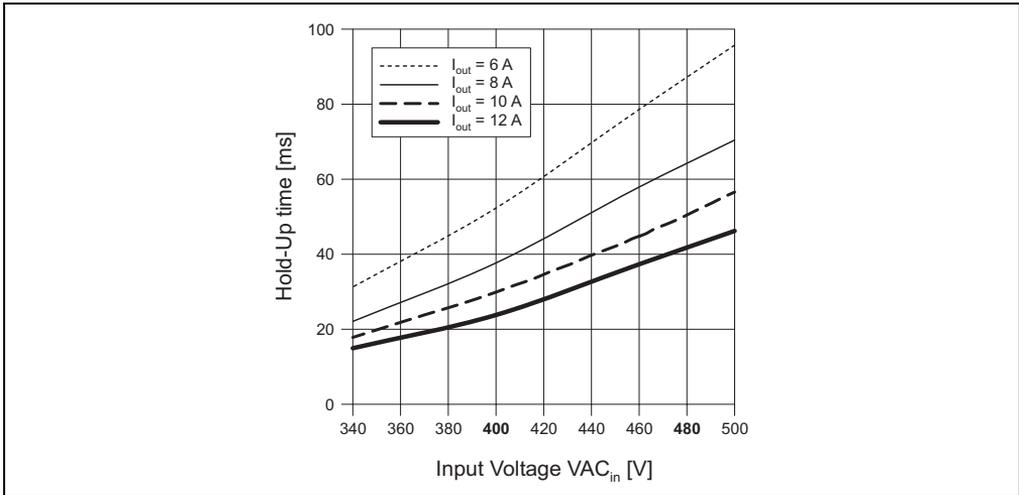


Figure 9: PS310 - Hold-up time, 3-phase (typ., at V_{out} = 24.5 V)

7.4 Hold-up time, 2-phase

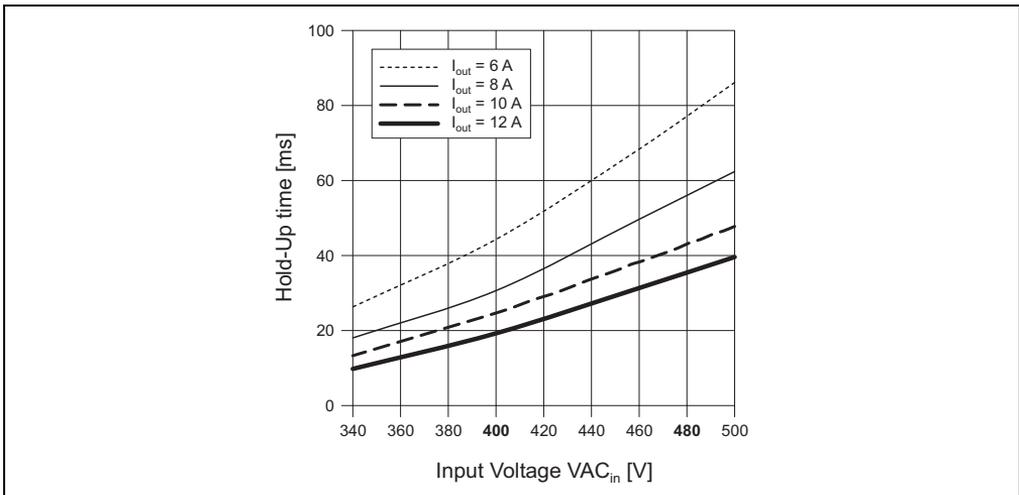


Figure 10: PS310 - Hold-up time, 2-phase (typ., at V_{out} = 24.5 V)

8. Standards and Certifications

Electromagnetic emissions (EME)	EN 61000-6-3 (also includes EN 61000-6-4) Class B (EN 55011, EN 55022) incl. Annex A through noise suppression
Immunity to disturbances Static discharge (ESD) Electromagnetic radiated fields Burst, coupled to: AC _{in} lines DC _{out} lines Surge transients Differential (L ₁ ->PE) Common mode (L ₁ ->L ₂ /N) Conducted noise immunity Mains breaks Transient immunity	EN 61000-6-2 (also includes EN 61000-6-1) EN 61000-4-2, Level 4 (withstands 8 kV direct discharge, 15 kV air discharge) EN 61000-4-3, Level 3 (10 V/m), ENV 50204 (10 V/m) EN 61000-4-4, Level 4 (4 kV) EN 61000-4-4, Level 3 (2 kV) EN 61000-4-5, Installation class 4 (4 kV) (SLD2.5: class 3 (2 kV)) EN 61000-4-5, Installation class 4 (2 kV) (SLD2.5: class 3 (1 kV)) EN 61000-4-6, Level 3 (10 V, 150 kHz - 80 MHz) EN 61000-4-11 Transient resistance according to VDE 0160 / W2 over entire load range
Safe low voltage	SELV (EN 60950, VDE0100/T.410), PELV (EN 50178)
Protection class/degree	Class I (EN 60950) / IP20 (EN 60529)
The power supply PS310 complies with all major safety certifications for EU (EN 60950, EN 60204-1), USA (UL 1950, UL508 LISTED), Canada (CUL/CSA-C22.2 No 60950), CB Scheme (IEC 60950), and meets the European Standard for electronic equipment in electrical power installations EN 50178.	
    	

Table 4: PS310 - Standards and certifications